

PERFORMANCE REPORT

As Required by

FEDERAL AID IN SPORT FISH RESTORATION ACT

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INLAND FISHERIES DIVISION MONITORING AND MANAGEMENT PROGRAM

2016 Fisheries Management Survey Report

Eagle Mountain Reservoir

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SURVEY AND MANAGEMENT SUMMARY

Fish populations in Eagle Mountain Reservoir were surveyed in 2016 using trap nets and electrofishing, and 2017 using gill nets. Historical data are presented with the 2016-2017 data for comparison. This report summarizes the results of the surveys and contains a management plan for the reservoir based on those findings.

- **Reservoir Description:** Eagle Mountain Reservoir is an 8,504-acre impoundment constructed on the West Fork Trinity River by the Tarrant Regional Water District (TRWD) in 1932 for municipal and industrial purposes. The reservoir is located in northwest Fort Worth. The reservoir is approximately 10 miles long and 3.5 miles wide (widest point), drains 1,970 square miles of watershed and has 93.5 miles of shoreline. Conservation pool elevation is 649 feet above mean-sea-level and storage capacity at conservation pool is 179,880 acre-feet. Angler and boat access is fairly limited. Texas Parks and Wildlife Department (TPWD) sold a tract of land that was proposed to be developed into a state park on the reservoir to the TRWD in 2008. TRWD has developed some hiking and biking trails but no angler access was incorporated. There is one ADA compliant fishing pier on the reservoir. Fishery habitat consisted primarily of natural banks, rocky shorelines, and boat docks.
- **Management History:** Important sport fish include Largemouth Bass, crappies, White Bass, and Blue and Channel Catfish. All species are managed with statewide regulations. The reservoir has a population of large Blue Catfish. Florida Largemouth Bass were stocked in 2014 and 2015.
- **Fish Community**
 - **Prey species:** Gizzard and Threadfin Shad were in great relative abundance in the reservoir. Bluegill and Longear Sunfish are also available as prey. Some Bluegill over 6 inches are available for anglers.
 - **Catfishes:** Blue Catfish continued to increase and produced some large individuals. Relative abundance of 7-8 inch Blue Catfish indicated a strong year class entering the fishery. Blue Catfish were the second most sought after species during the 2016/2017 creel survey. The relative abundance of Channel Catfish has decreased during the past three surveys. Although present, no Flathead Catfish were sampled during 2017 gill netting.
 - **White Bass:** White Bass catch rates remained stable compared to the previous survey.
 - **Black basses:** The Spotted Bass population has decreased during the last three surveys. The Largemouth Bass population had varied in abundance during the last three surveys but remained good. Size distribution is skewed towards smaller fish. Largemouth Bass were the most sought after species during the 2016/2017 annual creel survey.
 - **Crappies:** The relative abundance of White Crappie had decreased over the past three survey. Black Crappie were now the more abundant crappie species.

Management Strategies: Monitor zebra mussels in Eagle Mountain Reservoir. General monitoring with gill netting, trap netting, and electrofishing will be conducted in 2020-2021, when the next report will be written.

INTRODUCTION

This document is a summary of fisheries data collected from Eagle Mountain Reservoir in 2016-2017. The purpose of the document is to provide fisheries information and make management recommendations to protect and improve the sport fishery. While information on other species of fishes was collected, this report deals primarily with major sport fishes and important prey species. Historical data are presented with the 2016-2017 data for comparison.

Reservoir Description

Eagle Mountain Reservoir is an 8,504-acre impoundment constructed on the West Fork Trinity River by the Tarrant Regional Water District (TRWD) in 1932 for municipal and industrial purposes. The reservoir is located in northwest Fort Worth. The reservoir is approximately 10 miles long and 3.5 miles wide (widest point), drains 1,970 square miles of watershed and has 93.5 miles of shoreline. Conservation pool elevation is 649 feet above mean-sea-level (ft msl) and storage capacity is 179,880 acre-feet. Water levels usually fluctuate widely but have remained good since 2015 (Figure 1). Eagle Mountain Reservoir was hypereutrophic with a mean TSI chl-*a* of 61.96 (Texas Commission on Environmental Quality 2011). Texas Parks and Wildlife Department sold a tract of land that was proposed to be developed into a state park on the reservoir to the TRWD in 2008. TRWD has developed some hiking and biking trails but no angler access was incorporated in order to maintain the natural state of the area. Fishery habitat consisted primarily of natural banks, rocky shorelines, and boat docks. Other descriptive characteristics for Eagle Mountain Reservoir are in Table 1.

Angler Access

Eagle Mountain Reservoir has 9 public boat ramps. Several are not useable during periods of low water. Extension of the ramps may not be feasible unless dredging takes place. The TRWD recently renovated the park at Twin Points beginning in the fall of 2009. A two-lane boat ramp with parking for approximately 60 vehicles opened in May of 2013. In 2015, a swimming beach and RV camping opened to the public. There is one ADA compliant fishing pier on the reservoir. Additional boat ramp characteristics are in Table 2. Shoreline access is very limited and restricted to the public boat ramp areas.

Management History

Previous management strategies and actions: Management strategies and actions from the previous survey report (Hungerford and Brock 2013) included:

1. Eagle Mountain Reservoir supports a very popular Largemouth Bass fishery. Pure Florida genetics were not detected in 2012.
Action: Stocked Florida Largemouth Bass in 2014 and 2015. Fin clips were collected during the 2016 electrofishing survey. The results are included in this report.
2. Creel data have not been collected since the spring quarter of 2002.
Action: Conducted 36-day annual creel survey at Eagle Mountain Reservoir from June 2016-May 2017. Results are included in this report.
3. Communicate with TRWD regarding posting of signs and boat ramp stencils educating the public about the spread of aquatic nuisance species; specifically zebra mussels. Emphasize the importance of cleaning, draining, and drying vessels when leaving all reservoirs to reduce the risk of spreading zebra mussels.
Action: Signs were distributed to the TRWD for display at public access points. We made a speaking point when talking to the public about the importance of cleaning, draining, and drying vessels prior to launching at other water bodies. Zebra mussels were found in Eagle Mountain Reservoir in 2016.

Harvest regulation history: Sport fish populations in Eagle Mountain Reservoir have always been managed with statewide regulations (Table 3).

Stocking history: The last stocking of Eagle Mountain Reservoir occurred in 2015 and consisted of Florida Largemouth Bass. The complete stocking history is in Table 4.

Vegetation/habitat management history: Eagle Mountain Reservoir has limited aquatic vegetation and consists primarily of native emergent species such as lotus, cattail, and some *Scirpus*.

Water transfer: Eagle Mountain Reservoir is primarily used as municipal water supply, and to a lesser extent, flood control. Eagle Mountain is directly downstream of Bridgeport Reservoir on the West Fork of the Trinity River. Zebra mussels were found in Eagle Mountain in 2016. Water can be transferred to Eagle Mountain via a pipeline of mixed water from Cedar Creek and Richland Chambers Reservoirs in East Texas.

METHODS

Surveys were conducted to achieve survey and sampling objectives in accordance with the objective-based sampling (OBS) plan for Eagle Mountain (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Primary components of the OBS plan are listed in Table 5. All survey sites were randomly selected and all surveys were conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Electrofishing – Black Basses, sunfishes, Gizzard Shad, and Threadfin Shad were collected by electrofishing (1.5 hours at 18, 5-min stations). Catch per unit effort (CPUE) for electrofishing was recorded as the number of fish caught per hour (fish/h) of actual electrofishing.

Trap netting – Crappie were collected using trap nets (10 net nights at 10 stations). CPUE for trap netting was recorded as the number of fish caught per net night (fish/nn).

Gill netting – Blue and Channel Catfish and White Bass were collected by gill netting (10 net nights at 10 stations). CPUE for gill netting was recorded as the number of fish caught per net night (fish/nn).

Genetics – Genetic analysis of Largemouth Bass was conducted according to the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015). Micro-satellite DNA analysis was used to determine genetic composition of individual fish from 2005 through 2016 and by electrophoresis for previous years.

Statistics – Sampling statistics (CPUE for various length categories), structural indices [Proportional Size Distribution (PSD), terminology modified by Guy et al. 2007], and condition indices [relative weight (W_r)] were calculated for target fishes according to Anderson and Neumann (1996). Index of vulnerability (IOV) was calculated for Gizzard Shad (DiCenzo et al. 1996). Standard error (SE) was calculated for structural indices and IOV. Relative standard error ($RSE = 100 \times SE$ of the estimate/estimate) was calculated for all CPUE and creel statistics.

Creel survey – A year-long roving-creel survey was conducted from June 2016 through May 2017. Angler interviews were conducted on 5 weekend days and 4 weekdays per quarter to assess angler use and fish catch/harvest statistics in accordance with the Fishery Assessment Procedures (TPWD, Inland Fisheries Division, unpublished manual revised 2015).

Water level – Source for water level data was the United States Geological Survey (USGS 2017).

RESULTS AND DISCUSSION

Habitat: Littoral zone habitat was last surveyed in 2008 and consisted primarily of natural banks, rocky shorelines, and boat docks (Hungerford and Brock 2009; Table 6). Eagle Mountain Reservoir has limited aquatic vegetation and consists primarily of native emergent species such as lotus, cattail, and some *Scirpus*.

Creel: Directed fishing effort by anglers was highest for Largemouth Bass (62.3%), followed by anglers fishing for Blue Catfish (10.8%) and 'anything' (8.9%; Table 7). Total trip expenditures for the year-long survey were estimated at \$229,141.

Prey species: The electrofishing catch rate of Threadfin Shad was 1,052.7/h (Appendix A) which is above the reservoir average of 510.0/h (Appendix C). The Gizzard Shad electrofishing catch rate has varied over the past 6 from a low of 379.3/h in 2016 to a high of 765.3/h in 2011 (Figure 2). The reservoir average CPUE of Gizzard Shad was 470.8/h. Index of vulnerability (IOV) for Gizzard Shad varied from 77 to 84 between 2011 and 2016. The 2016 IOV indicated 80% of Gizzard Shad were available to predators. The electrofishing catch rate of Bluegill varied from a low of 150.7 to a high of 226.7/h (Figure 3) from 2011-2016. The Bluegill population provided some forage at Eagle Mountain, but does not produce many large fish for anglers. The catch rate of Bluegill over 6 inches has decreased in each survey since 2011 as has the PSD (Figure 3). The Longear Sunfish electrofishing CPUE was 76.0/h (Appendix A) and was below the reservoir average of 113.3/h (Appendix C).

Catfishes: The gill netting catch rate of Blue Catfish in 2017 of 26.2/nn (Figure 4) was the highest ever recorded at Eagle Mountain and well above the reservoir average of 8.4/nn (Appendix C). Catch per unit effort of sub-stock Blue Catfish was 17.6/nn and PSD was 29. These data suggest the population has had excellent production and a strong year class. Mean relative weight varied between 85 and 115. Blue Catfish were the second most sought-after species in the 2016/2017 creel survey (Table 7). Anglers caught Blue Catfish at a rate of 1.1 fish/h and total harvest was 783 fish over the year-long survey (Table 8) with 88.1% of legal-size fish being released. Blue Catfish observed as harvested in the creel ranged in length from 12 inches up to 30 inches (Figure 5).

The gill netting catch rate of Channel Catfish was 2.4 /nn in 2017 which was lower than 2009 (9.3/nn) and 2013 (6.8/nn; Figure 5). Catch rates of Channel Catfish have decreased each survey since 2009 and the 2017 survey was the lowest since 2001 (Appendix C). The 2017 survey was below the reservoir average of 6.3/nn (Appendix C) and size distribution of the population decreased significantly as PSD dropped from 25 in 2013 to 5 in 2017. Only 1.7% of all fishing effort during the 2016/2017 creel survey was directed at Channel Catfish, however, 8.4% of anglers were targeting catfishes (Table 7). Channel Catfish were caught at a rate of 0.2 fish/h and total harvest was estimated to be 689 fish over the year-long survey (Table 9) with 28.4% of legal-size fish being released. All Channel Catfish observed as harvested during the survey were of legal length (Figure 7).

Temperate basses: The gill netting catch rates of White Bass have been quite variable since 2009 (Appendix C). The 2017 gill netting survey produced a catch rate of 7.5/nn (Figure 8) which was below the reservoir average of 9.0/nn. Size structure of the population was dominated by larger fish as indicated by a PSD value of 99. Mean relative weights were near optimal for all fish ≥ 9 inches. White Bass were sought after by 5.8% of all anglers surveyed during the 2016/2017 creel (Table 7). Anglers caught White Bass at a rate of 0.59 fish/h and total harvest was 561 fish over the year-long survey (Table 10) with 46.5% of legal-size fish being released. All White Bass observed as harvested during the survey were of legal length (Figure 9).

One Yellow Bass was collected during the 2013 gill netting survey marking the first record of the species in Eagle Mountain Reservoir. The most likely source of introduction is the TRWD pipeline that moves

water from Richland-Chambers and Cedar Creek Reservoirs in East Texas. This pipeline also moves water to Benbrook and Arlington Reservoirs which also now have established populations of Yellow Bass. The 2017 gill netting CPUE of Yellow Bass was 2.1/nn (Appendix A) indicating a growing population.

Black basses: The total electrofishing catch rate of Spotted Bass between 2011 and 2016 varied from a low of 8.0/h to a high of 16.7/h and appeared to be a low-density population (Figure 10). Spotted Bass CPUE since about 2000 has consistently remained lower than the reservoir average of 25.4/h.

The total CPUE of Largemouth Bass over the past four years has varied from a low of 92.0/h in 2016 to a high of 171.3/hr in 2012 (Figure 11). The 2016 survey produced the lowest total CPUE of Largemouth Bass since 2009 (Appendix C). Stock CPUE was 69.3/h in 2016. Catch per unit effort of Largemouth Bass over 14 inches was 10.0/h in 2016, which is lower than the 2011 (20.7/h) and 2012 (14.7/h) surveys. The size structure of the population continued to indicate a population made up of mostly sub-legal fish with consistent recruitment. Mean relative weights in 2016 was near optimal for most length classes, outside of one 17-inch fish. A category-4 age and growth analysis was conducted during the fall of 2012, and on average, Largemouth Bass reach the 14-inch minimum length limit between 2 and 3 years (Hungerford and Brock 2013). The 2016 Florida allele percentage was 43% indicating introgression following stocking in 2014 and 2015, and one pure Florida Largemouth Bass was collected in our sample of 30 fish (Table 12). Largemouth Bass were the most sought-after species during the 2016/2017 creel survey with 62.3% of all effort with 3.0 hours of effort per surface acre of Eagle Mountain Reservoir. Anglers caught Largemouth Bass at a rate of 0.7 fish per hour with 509 fish being harvested over the year-long survey (Table 11) with 90.7% of legal-size fish being released by non-tournament anglers. Some harvest of sub-legal fish was observed (Figure 12). Tournament angling accounted for about 20% of all effort for Largemouth Bass at Eagle Mountain (Table 11).

Crappies: The trap netting catch rate of White Crappie has dropped from 3.7/nn in 2004 to 1.1/nn in 2016 (Appendix C). Crappies were targeted by just 2.1% of anglers encountered during the 2016/2017 creel survey (Table 7). Anglers caught crappies at a rate of 0.8 fish/h and total harvest was 45 during the year-long survey (Table 13). All crappies observed as harvested were of legal size (Figure 14) with no legal-size fish being released (Table 13).

The Black Crappie trap netting catch rate of 6.9/nn in 2012 was the highest CPUE ever recorded at Eagle Mountain (Appendix C). In 2016, Black Crappie total CPUE was 1.6/nn. As the population of White Crappie has declined, the Black Crappie population has increased. Only 16 Black Crappie were collected in 2016 (Figure 13).

Fisheries management plan for Eagle Mountain Reservoir, Texas

Prepared – July 2017.

ISSUE 1: Many invasive species threaten aquatic habitats and organisms in Texas and can adversely affect the state ecologically, environmentally, and economically. For example, zebra mussels (*Dreissena polymorpha*) can multiply rapidly and attach themselves to any available hard structure, restricting water flow in pipes, fouling swimming beaches and plugging engine cooling systems. Zebra mussel larvae and adults have been found in Bridgeport Reservoir, which is directly upstream of Eagle Mountain and adult zebra mussels were found in Eagle Mountain in June of 2016. Giant salvinia (*Salvinia molesta*) and other invasive vegetation species can form dense mats, interfering with recreational activities like fishing, boating, skiing and swimming. The financial costs of controlling and/or eradicating these types of invasive species are significant. Additionally, the potential for invasive species to spread to other river drainages and reservoirs via watercraft and other means is a serious threat to all public waters of the state.

MANAGEMENT STRATEGIES

1. Cooperate with TRWD to post appropriate signage at access points around the reservoir.
2. Contact and educate marina owners about invasive species, and provide them with posters, literature, etc.... so that they can in turn educate their customers.
3. Continue to monitor zebra mussel settlement samplers located at all marinas on Eagle Mountain.

Objective-Based Sampling Plan and Schedule 2017-2021

Sport fish, forage fish, and other important fishes

Sport fishes in Eagle Mountain Reservoir include Blue Catfish, crappies, White Bass, and Largemouth Bass. Known important forage species include Bluegill, Gizzard and Threadfin Shad, and Longear Sunfish.

Low-density fisheries

Flathead Catfish: Flathead Catfish are present in Eagle Mountain Reservoir, however, there was no directed effort for them. We will record CPUE and size structure data from all Flathead Catfish coincidentally collected by gill nets targeting White Bass and Blue Catfish.

Channel Catfish: Channel Catfish had just 1.7% directed effort during the 2016/2017 year-long creel survey and relative abundance is low. The past three gill netting surveys have produced an average CPUE-stock of just 4.0 fish/nn with highly variable RSEs. Catch per unit effort and body condition data will be collected from all Channel Catfish coincidentally captured in gill netting surveys conducted for White Bass and Blue Catfish.

Spotted Bass: Spotted Bass are present in rocky areas of Eagle Mountain Reservoir, however, there is no directed effort for them. We will record CPUE and size structure data from all Spotted Bass coincidentally captured by electrofishing surveys directed at Largemouth Bass.

Survey objectives, fisheries metrics, and sampling objectives

Largemouth Bass: Largemouth Bass are the most popular sport fish in Eagle Mountain Reservoir. The popularity and reputation for quality Largemouth Bass fishing at this reservoir warrant sampling time and effort. Results from a 2016/2017 creel survey showed directed angling effort for Largemouth Bass to be 25,788.6 hours (3.0 h/acre), and harvest of Largemouth Bass was estimated to be 509 fish by non-tournament anglers. Tournament angling accounted for about 20% of total angling effort at Eagle Mountain during that same period. Largemouth Bass have always been managed with the statewide 14-in MLL regulation. Trend data on CPUE, size structure, and body condition have been collected often since 1986 with fall nighttime electrofishing. The population appears to be in good shape. Continuation of trend data every four years in this reservoir with night electrofishing in the fall will allow for determination of any large-scale changes in the Largemouth Bass population that may spur further investigation. A minimum of 18 randomly selected 5-min electrofishing sites will be sampled in 2020, but sampling will continue at random sites until 50 stock-size fish are collected and the RSE of CPUE-S is ≤ 25 (the anticipated effort to meet both sampling objectives is 15-18 stations with 80% confidence). Eighteen random stations will be sampled. Exclusive of the original 18 random stations, 3 additional random stations will be pre-determined in the event some extra sampling is necessary. If failure to achieve either objective has occurred after two nights of sampling and objectives can be attained with 6-12 additional random stations, another night of effort will be expended. Fins from 30 Largemouth Bass will be clipped for genetic analysis also in 2020.

Blue Catfish: Blue Catfish were the second most sought-after sport during the 2016/2017 year-long creel survey at Eagle Mountain Reservoir. Total harvest of Blue Catfish was 783 fish during that same period. Historically, 10 random gill net nights have provided good relative abundance and size structure data but RSEs ranged from 11 to 26. A standard gill netting survey with 10 net nights will be conducted in 2020-2021 and we will record all CPUE and body condition data. Day-time, low-frequency electrofishing surveys will be conducted at random stations in 2018 and 2020 to obtain population statistics of Blue Catfish population and to determine if this is a more efficient method of sampling.

White Bass: White Bass were the fifth most popular sport fish in Eagle Mountain Reservoir according to the year-long creel survey in 2016/2017, accounting for 5.8% of all directed effort (0.3 h/acre). Over the past 3 surveys (2009, 2013, and 2017), 10 random gill net nights have produced an average CPUE of 13.3 fish/nn with RSEs varying from 22-45. We plan on conducting 10 random gill net nights in 2021 to monitor CPUE trend data and size structure.

Crappies: Crappie relative abundance is fairly low according to recent trap netting surveys, however, anglers were targeting them as well as catching them. A 2016/2017 creel survey revealed that Crappie are the six most sought-after sport fish in Eagle Mountain Reservoir, with 2.1% of all directed effort. We would like to collect information allowing us to monitor size structure. We feel single-cod, shoreline trap nets set are adequate for obtaining these data and will set 10 random trap nets in 2020.

Prey species: Bluegill, Longear Sunfish, Threadfin Shad, and Gizzard Shad are the primary forage at Eagle Mountain Reservoir. Like Largemouth Bass, trend data on CPUE and size structure of all four species have been collected often since 1986. Continuation of sampling, as per Largemouth Bass above, will allow for monitoring of large-scale changes in Bluegill, Longear Sunfish, Threadfin Shad, and Gizzard

Shad relative abundance and size structure. Sampling effort based on achieving sampling objectives for Largemouth Bass will result in sufficient numbers of Bluegill, Longear Sunfish, Threadfin Shad, and Gizzard Shad for size structure estimation (IOV for Gizzard Shad only; 50 fish minimum at 5-12 stations with 80% confidence) but may not provide RSE ≤ 25 for relative abundance estimates (anticipated effort is 20 stations). At the sampling effort needed to achieve sampling objectives for Largemouth Bass, the expected RSE for CPUE-Total will likely be greater than 25 for Bluegill. No additional effort will be expended to achieve an RSE25 for CPUE of Bluegill and Gizzard Shad. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density. Relative weight of Largemouth Bass ≥ 8 " TL will be determined from their length/weight data (maximum of 10 fish weighed and measured per inch class).

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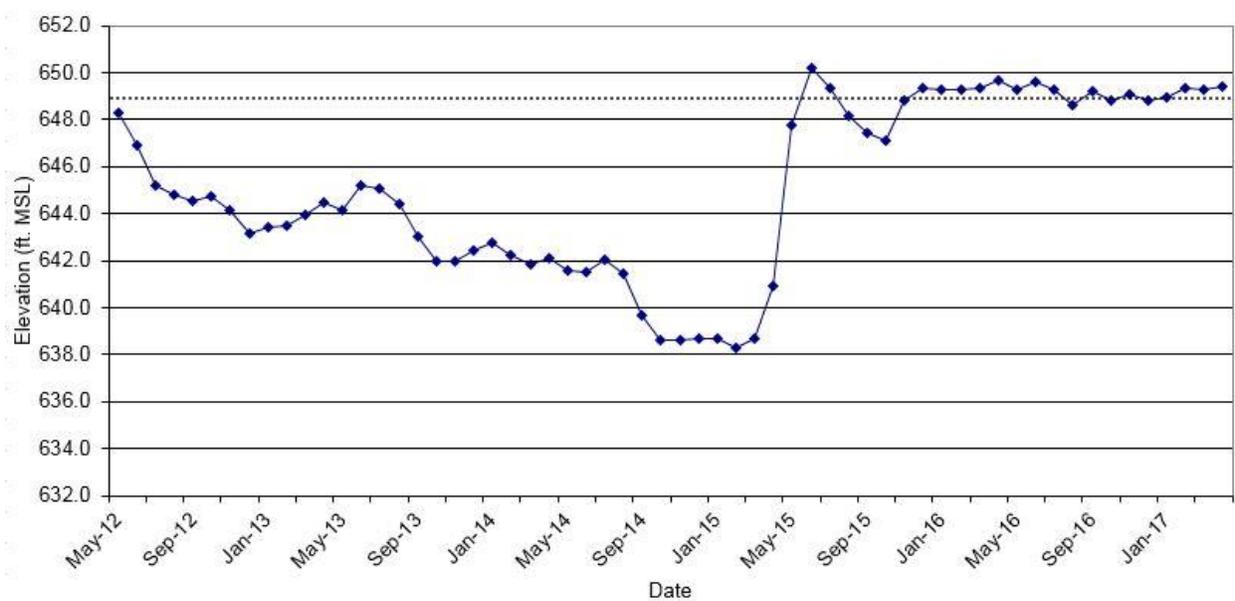


Figure 1. Mean monthly water level elevations in feet above mean sea level (MSL) recorded for Eagle Mountain Reservoir, Texas from May 2012-April 2017. Conservation pool is 649 feet above MSL (dashed line).

Table 1. Characteristics of Eagle Mountain Reservoir, Texas.

Characteristic	Description
Year constructed	1932
Controlling authority	Tarrant Regional Water District
Counties	Tarrant and Wise
Reservoir type	Mainstream Trinity River
Conductivity	303 $\mu\text{S}/\text{cm}$

Table 2. Boat ramp characteristics for Eagle Mountain Reservoir, Texas, fall 2016. Reservoir elevation at time of survey was 649.1 feet above mean sea level.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
West Bay Marina	32.93417 -97.51397	Y	50	640.1	Good.
Lakeview Marina	32.94834 -97.50889	Y	20	636.1	Good.
Creek Harbor Camp	32.96341 -97.48969	Y	17	N/A	Poor. Very shallow area.

Table 2, Continued.

Boat ramp	Latitude Longitude (dd)	Public	Parking capacity (N)	Elevation at end of boat ramp (ft)	Condition
Shady Grove Park	32.90811 -97.52989	Y	35	644.2	Poor. Very shallow area
Pelican Bay Ramp	32.91081 -97.51864	Y	25	642.9	Poor. Very shallow area.
Eagle Mountain Marina	32.86758 -97.50506	Y	125	638.5	Good.
Augie's	32.87235 -97.49708	Y	50	643.2	Good.
Twin Points	32.87562 -97.49323	Y	60	639.1	Good.
Harbor One Marina	32.89495 -97.44658	Y	20	639.8	Good.

Table 3. Harvest regulations for Eagle Mountain Reservoir

Species	Bag Limit	Length Limit (inches)
Catfish: Channel and Blue Catfish, their hybrids and subspecies	25 (in any combination)	12 - minimum
Catfish: Flathead	5	18 - minimum
Bass: White	25	10 - minimum
Bass: Spotted	5	none
Bass: Largemouth and Smallmouth	In any combination	14 - minimum
Crappie: White and Black Crappie, their hybrids and subspecies	25 (in any combination)	10 - minimum

Table 4. Stocking history of Eagle Mountain Reservoir, Texas. Life stages are fry (FRY), fingerlings (FGL), advanced fingerlings (AFGL), and unknown (UNK). Life stages for each species are defined as having a mean length that falls within the given length range. For each year and life stage the species mean total length (Mean TL; in) is given. For years where there were multiple stocking events for a particular species and life stage the mean TL is an average for all stocking events combined.

Species	Year	Number	Life Stage	Mean TL (in)
Blue Catfish	1991	92,147	FGL	2.1
	Total	<u>92,147</u>		
Channel Catfish	1969	48,000	AFGL	7.9
	1970	60,000	AFGL	7.9
	1971	10,964	AFGL	7.9
	1972	9,000	AFGL	7.9
	1973	200	UNK	0.0
	1979	<u>10,095</u>	AFGL	7.9
	Total	<u>138,259</u>		
Florida Largemouth Bass	1988	333,148	FRY	1.0
	1993	373,642	FGL	1.0
	1994	148,628	FGL	1.1
	2000	232,424	FGL	1.1
	2006	425,660	FGL	1.6
	2007	426,963	FGL	1.5
	2014	427,802	FGL	1.7
	2015	<u>508,235</u>	FGL	1.8
	Total	<u>2,876,502</u>		
Green Sunfish x Redear Sunfish	1970	<u>8,000</u>		0.0
	Total	<u>8,000</u>		
Largemouth Bass	1969	300,000	UNK	0.0
	1971	100,000	UNK	0.0
	1978	<u>275</u>	UNK	0.0
	Total	400,275		
Mixed Largemouth Bass	1988	127,095		1.0
	Total	127,095		

Table 4, continued

Species	Year	Number	Life Stage	Mean TL (in)
Smallmouth Bass	1978	84,800	UNK	0.0
	1979	34,460	UNK	0.0
	1980	1,200	UNK	0.0
	1999	<u>197,905</u>	FGL	1.5
Threadfin Shad	Total	318,365		
	1984	<u>2,985</u>	AFGL	3.0
Walleye	Total	2,985		
	1973	1,400,000	FRY	0.2
	1974	3,100,090	FRY	0.2
	1975	<u>2,150,090</u>	FRY	0.2
White Crappie	Total	6,650,180		
	1969	<u>20,000</u>	UNK	0.0
	Total	20,000		

Table 5. Objective-based sampling plan components for Eagle Mountain Reservoir, Texas 2016 – 2017.

Gear/target species	Survey objective	Metrics	Sampling objective
<i>Electrofishing</i>			
Largemouth Bass	Abundance	CPUE – stock	RSE-Stock \leq 25
	Size structure	PSD, length frequency	$N \geq 50$ stock
	Condition	W_r	10 fish/inch group (max)
	Genetics	% FLMB	$N = 30$, any age
Bluegill ^a	Abundance	CPUE – stock	RSE \leq 25
	Size structure	PSD, length frequency	$N \geq 50$
Gizzard Shad ^a	Abundance	CPUE – stock	RSE \leq 25
	Prey availability	IOV	$N \geq 50$

Table 5, continued.
Trap netting

	Crappie	Size structure	PSD, length frequency	N = 50
<i>Gill Netting</i>				
	Blue Catfish	Abundance Size structure	CPUE-stock	N≥50 N ≥ 50 stock
	Channel Catfish ^b	Abundance	CPUE– stock	RSE-Stock ≤ 25
	White Bass	Abundance Size structure	CPUE-stock PSD, length frequency	N≥50 N≥50 stock

^a No additional effort will be expended to achieve objectives of Bluegill and Gizzard Shad if not reached from designated Largemouth Bass sampling effort. Instead, Largemouth Bass body condition can provide information on forage abundance, vulnerability, or both relative to predator density.

^bNo additional effort will be expended to achieve an RSE ≤ 25 for CPUE of Channel Catfish if not reached from designated Blue Catfish sampling effort.

Table 6. Survey of structural habitat types, Eagle Mountain Reservoir, Texas, 2008. Shoreline habitat type units are in miles and standing timber is acres.

Habitat type	Estimate	% of total
Boat dock + native emergent + natural	0.1 miles	0.1
Boat dock + natural	12.2 miles	15.0
Boat dock + rock bluff	0.2 miles	0.2
Boat dock + rocky shoreline	17.3 miles	22.0
Bulkhead	0.3 miles	0.4
Bulkhead + boat dock	12.5 miles	15.4
Natural + native emergent	3.8 miles	4.7
Natural + native emergent + flooded terrestrial	0.7 miles	0.9
Natural + standing timber	4.7 miles	6.8
Rock bluff	0.1 miles	0.1
Standing timber	14.3 acres	0.2
Nondescript	27.3 miles	33.9

Table 7. Percent directed angler effort by species for Eagle Mountain Reservoir, Texas, 2016-2017. Survey period was from 1 June through 31 May.

Species	2016/2017
Channel Catfish	1.7
Blue Catfish	10.8
White Bass	5.8
Crappies	2.1
Largemouth Bass	62.3
Anything	8.9
Catfishes	8.4

Gizzard Shad

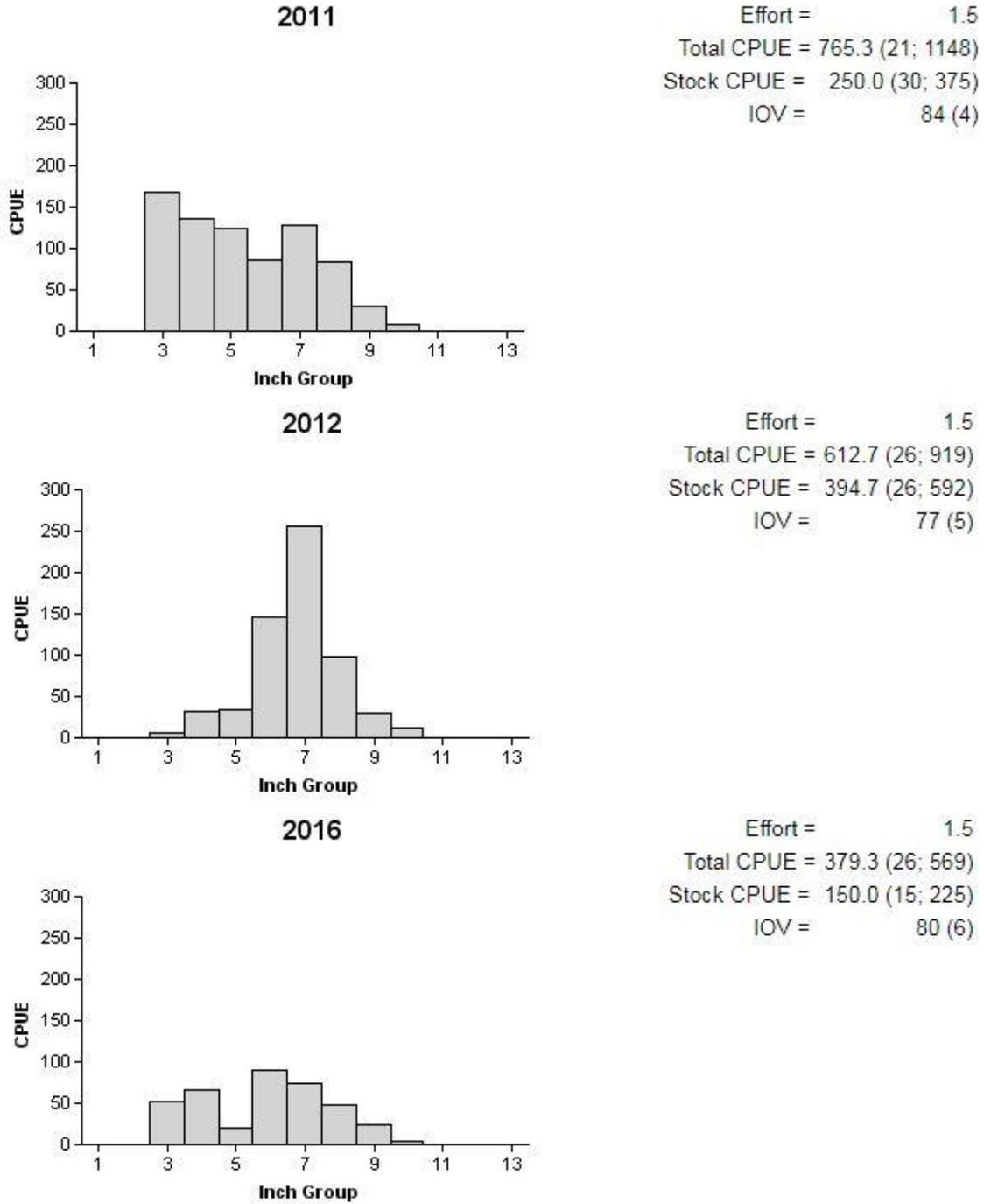


Figure 2. Number of Gizzard Shad caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for IOV are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2011, 2012, and 2016.

Bluegill

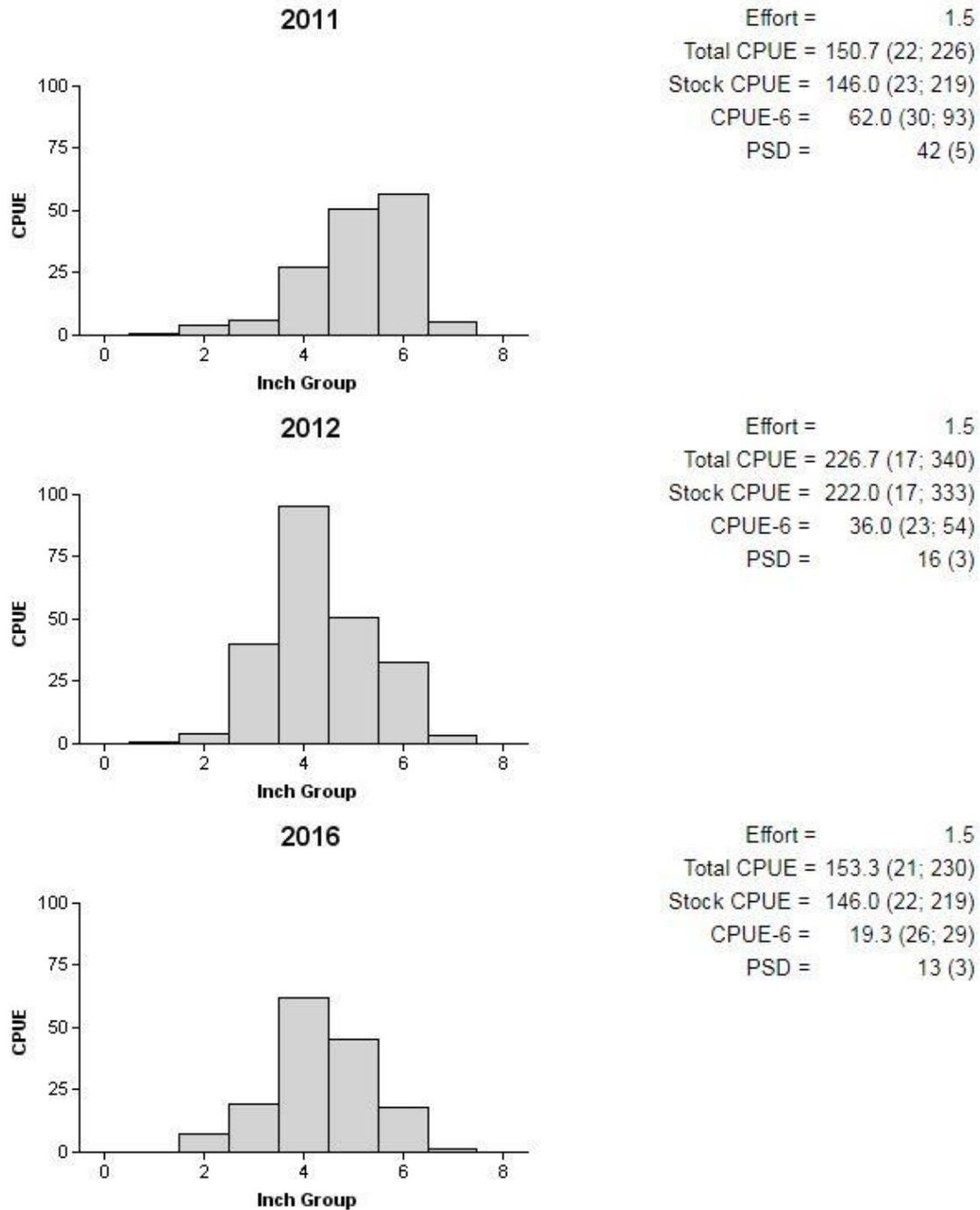


Figure 3. Number of Bluegill caught per hour (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2011, 2012, and 2016.

Blue Catfish

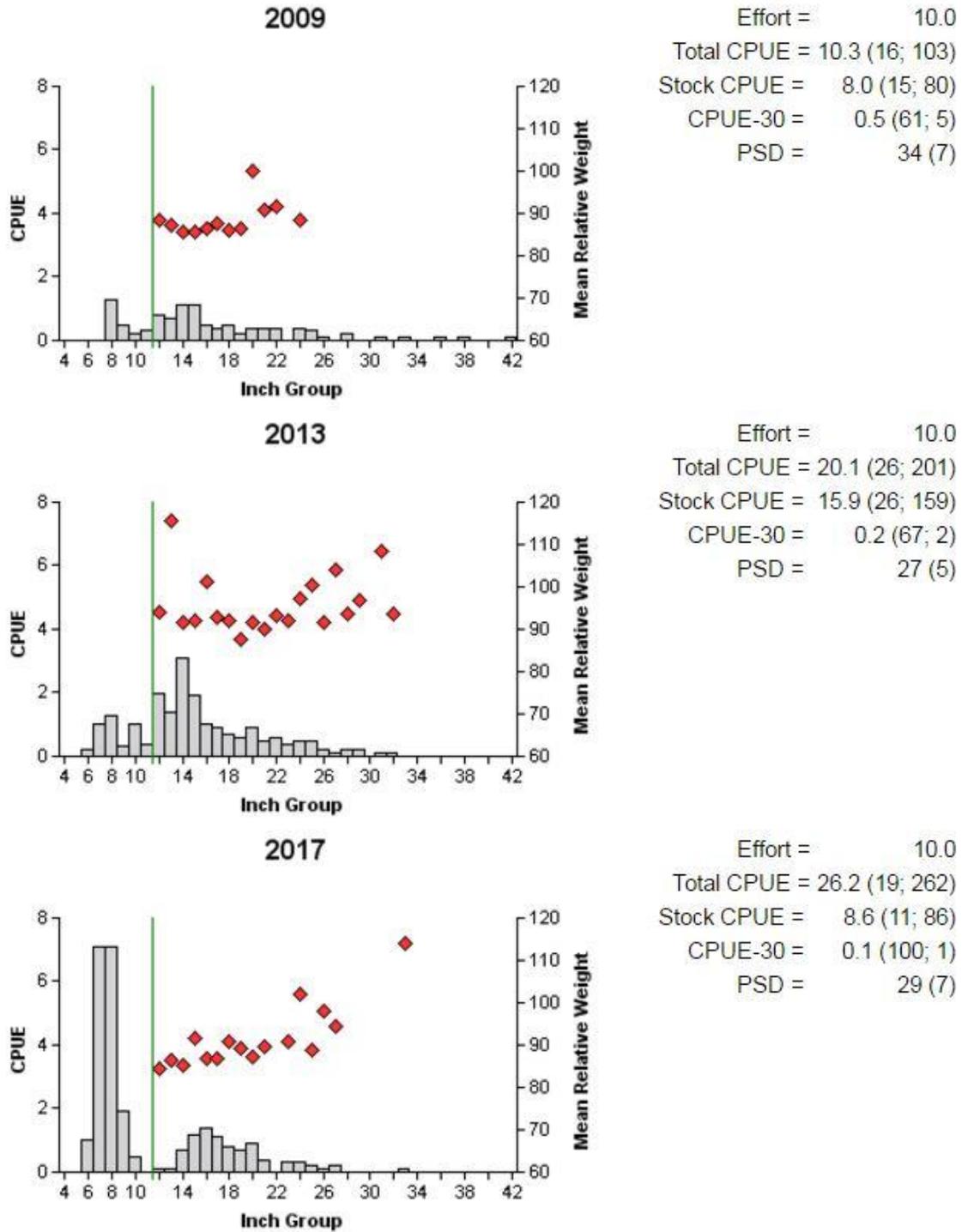


Figure 4. Number of Blue Catfish caught per net night (CPUE; bars) and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Eagle Mountain Reservoir, Texas, 2009, 2013, and 2017. Vertical line represents length limit at time of sampling.

Blue Catfish

Table 8. Creel survey statistics for Blue Catfish at Eagle Mountain Reservoir, Texas, from June 2016 through May 2017. Total catch per hour is for anglers targeting Blue Catfish and total harvest is the estimated number of Blue Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses. **[RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]**

Creel survey statistic	Year
	2016/2017
Surface area (acres)	8,504
Directed effort (h)	4,491.2 (30)
Directed effort/acre	0.5 (30)
Total catch per hour	1.1 (108)
Total harvest	782.9 (53)
Harvest/acre	0.1 (53)
Percent legal released	88.1

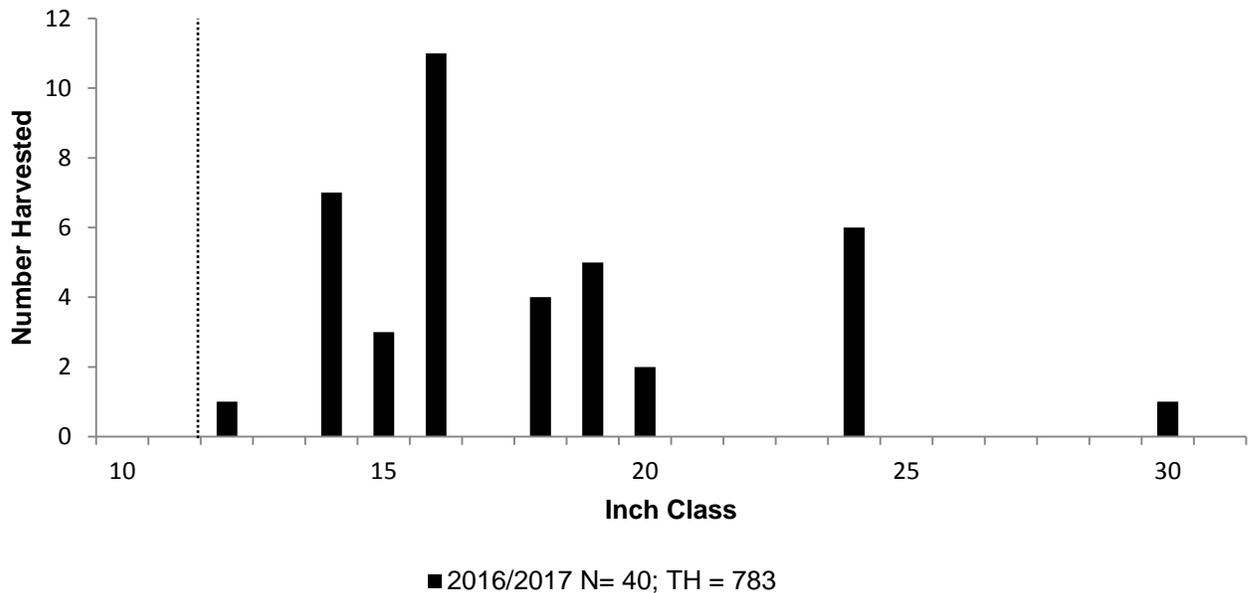


Figure 5. Length frequency of harvested Blue Catfish observed during creel surveys at Eagle Mountain Reservoir, Texas, June 2016 through May 2017, all anglers combined. N is the number of harvested Blue Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Dashed line indicates minimum length limit at time of survey.

Channel Catfish

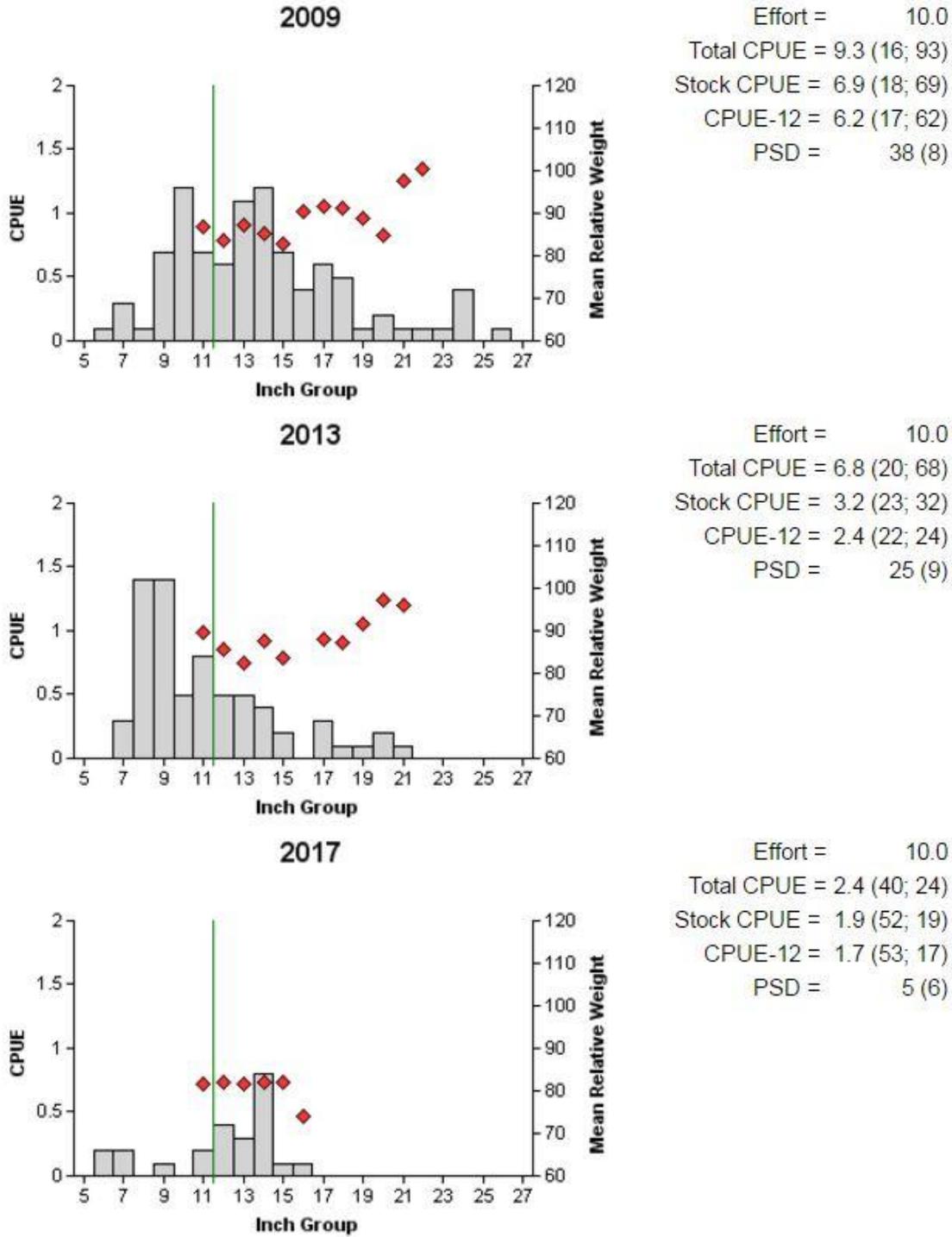


Figure 6. Number of Channel Catfish caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for spring gill net surveys, Eagle Mountain Reservoir, Texas, 2009, 2013, and 2017. Vertical line represents length limit at time of sampling.

Channel Catfish

Table 9. Creel survey statistics for Channel Catfish at Eagle Mountain Reservoir, Texas, from June 2016 through May 2017. Total catch per hour is for anglers targeting Channel Catfish and total harvest is the estimated number of Channel Catfish harvested by all anglers. Relative standard errors (RSE) are in parentheses. **[RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]**

Creel survey statistic	Year
	2016/2017
Surface area (acres)	8,504
Directed effort (h)	689.05 (55)
Directed effort/acre	0.08 (55)
Total catch per hour	0.19 (100)
Total harvest	336.94 (84)
Harvest/acre	0.04 (84)
Percent legal released	28.4

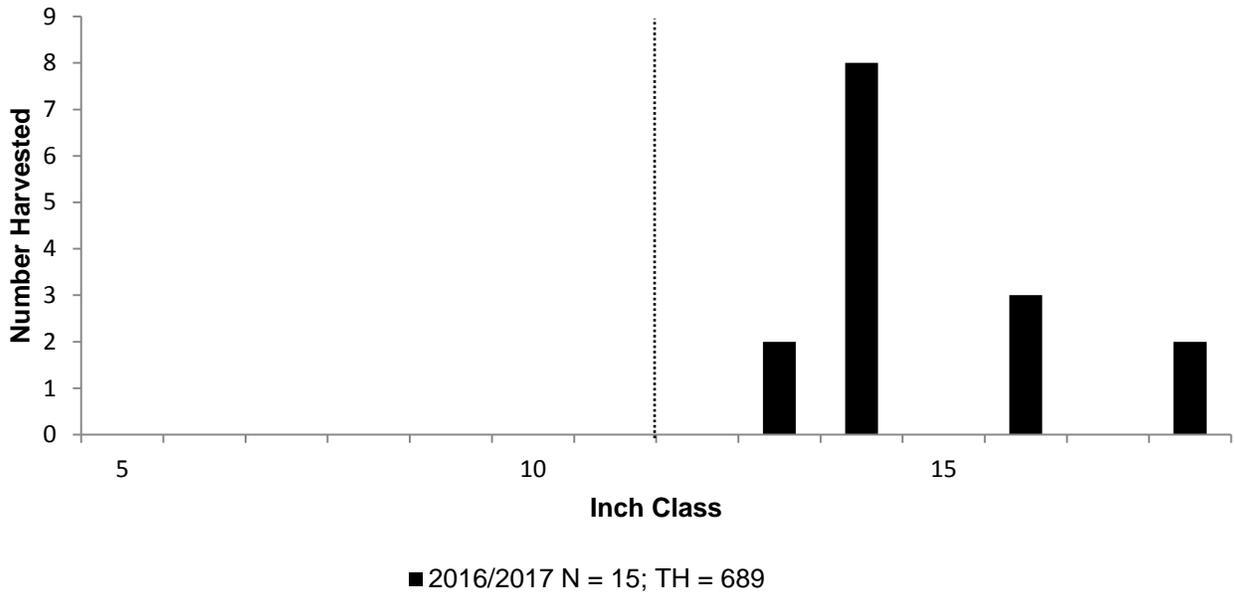


Figure 7. Length frequency of harvested Channel Catfish observed during creel surveys at Eagle Mountain Reservoir, Texas, June 2016 through May 2017, all anglers combined. N is the number of harvested Channel Catfish observed during creel surveys, and TH is the total estimated harvest for the creel period. Dashed line indicates minimum length limit at time of survey.

White Bass

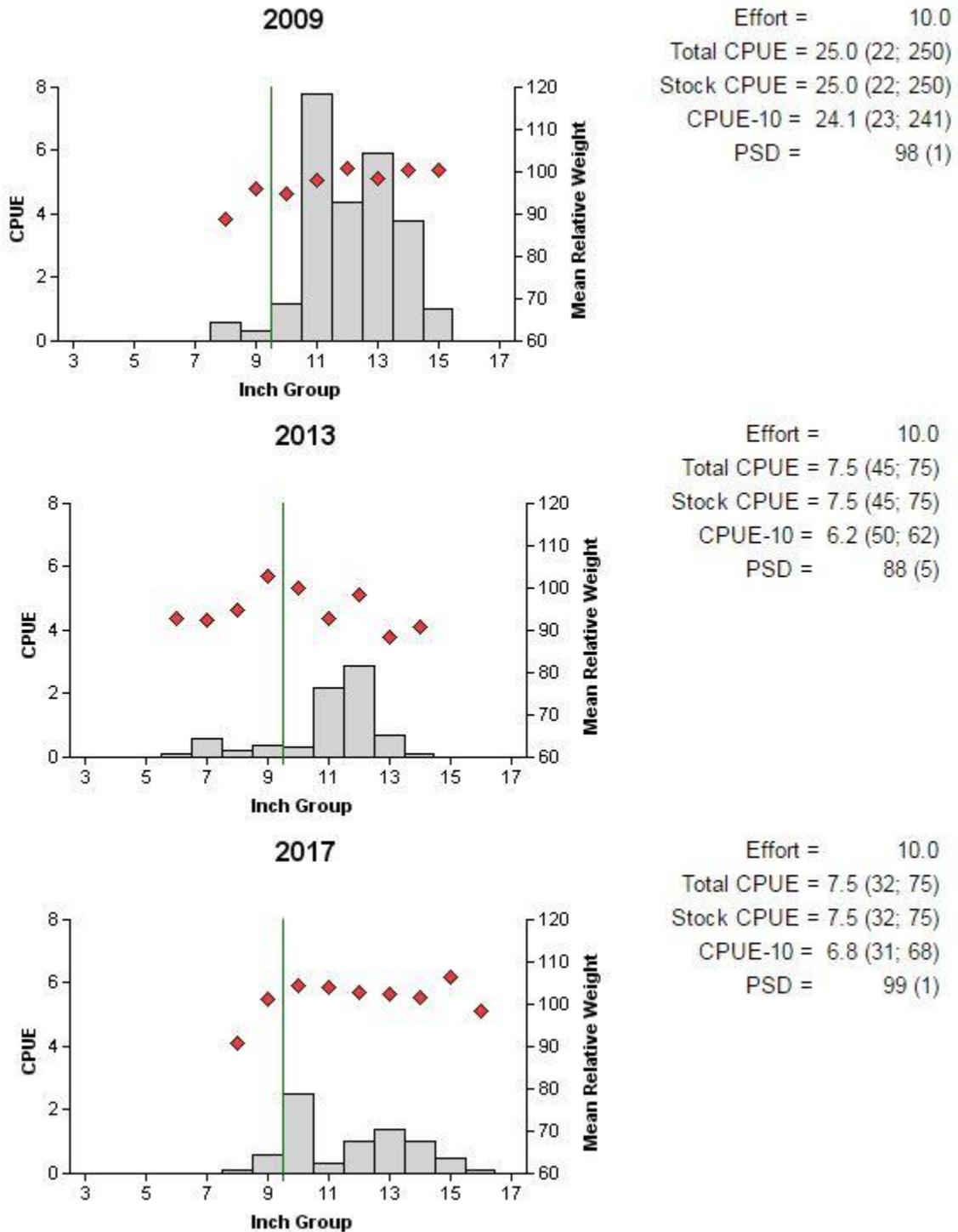


Figure 8. Number of White Bass caught per net night (CPUE; bars), mean relative weight (diamonds), and population indices (RSE and N are in parentheses) for spring gill net surveys, Eagle Mountain Reservoir, Texas, 2009, 2013, and 2017. Vertical line represents length limit at time of sampling.

White Bass

Table 10. Creel survey statistics for White Bass at Eagle Mountain Reservoir, Texas, from June 2016 through May 2017. Total catch per hour is for anglers targeting White Bass and total harvest is the estimated number of White Bass harvested by all anglers. Relative standard errors (RSE) are in parentheses. **[RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]**

Creel survey statistic	Year
	2016/2017
Surface area (acres)	8,504
Directed effort (h)	2,400.13 (35)
Directed effort/acre	0.28 (35)
Total catch per hour	0.59 (46)
Total harvest	560.54 (66)
Harvest/acre	0.07 (66)
Percent legal released	46.5

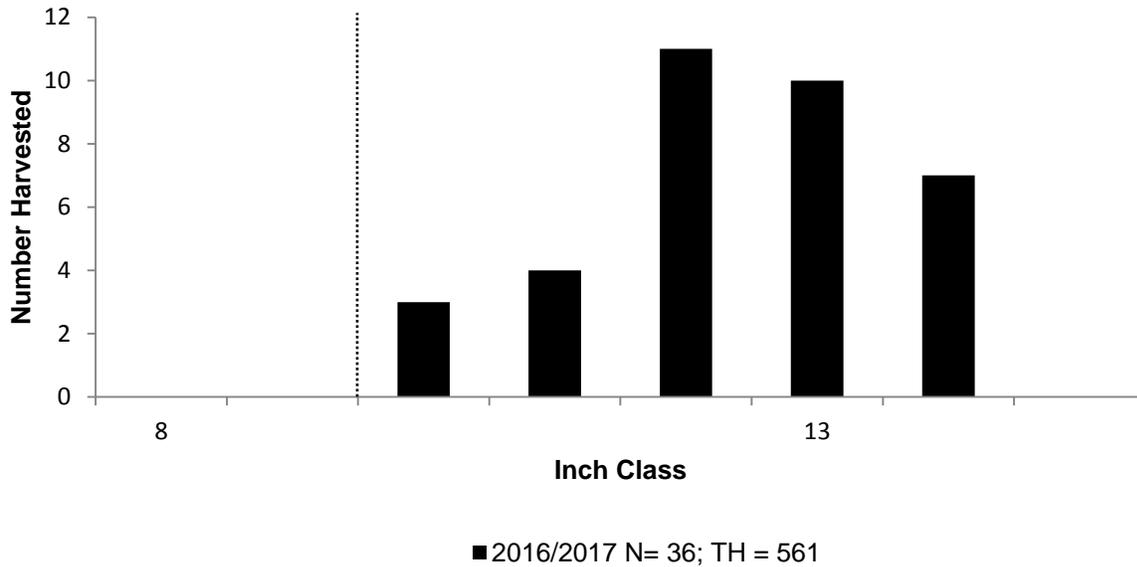


Figure 9. Length frequency of harvested White Bass observed during creel surveys at Eagle Mountain Reservoir, Texas, June 2016 through May 2017, all anglers combined. N is the number of harvested White Bass observed during creel surveys, and TH is the total estimated harvest for the creel period. Dashed line indicates minimum length limit at time of survey.

Spotted Bass

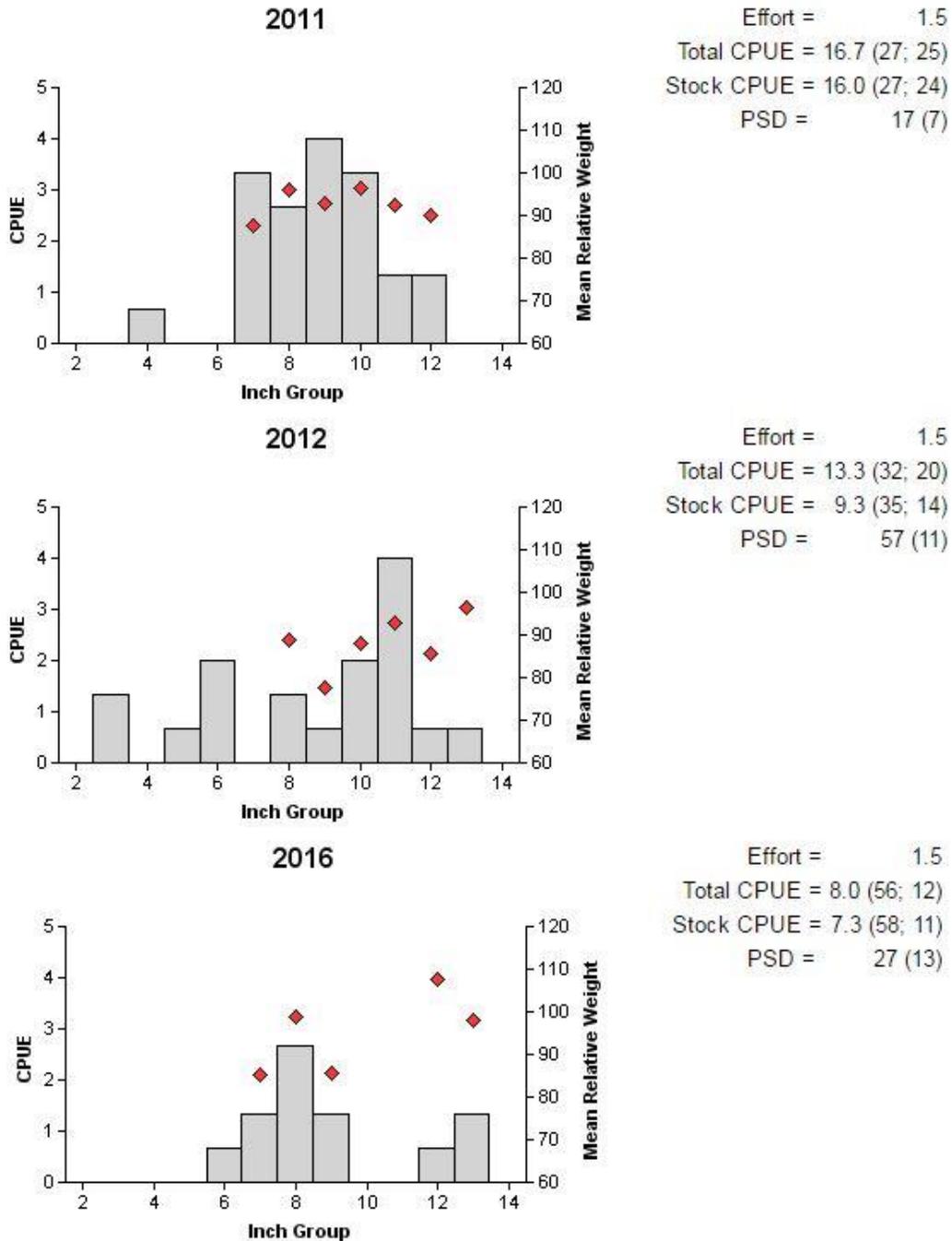


Figure 10. Number of Spotted Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2011, 2012, and 2016.

Largemouth Bass

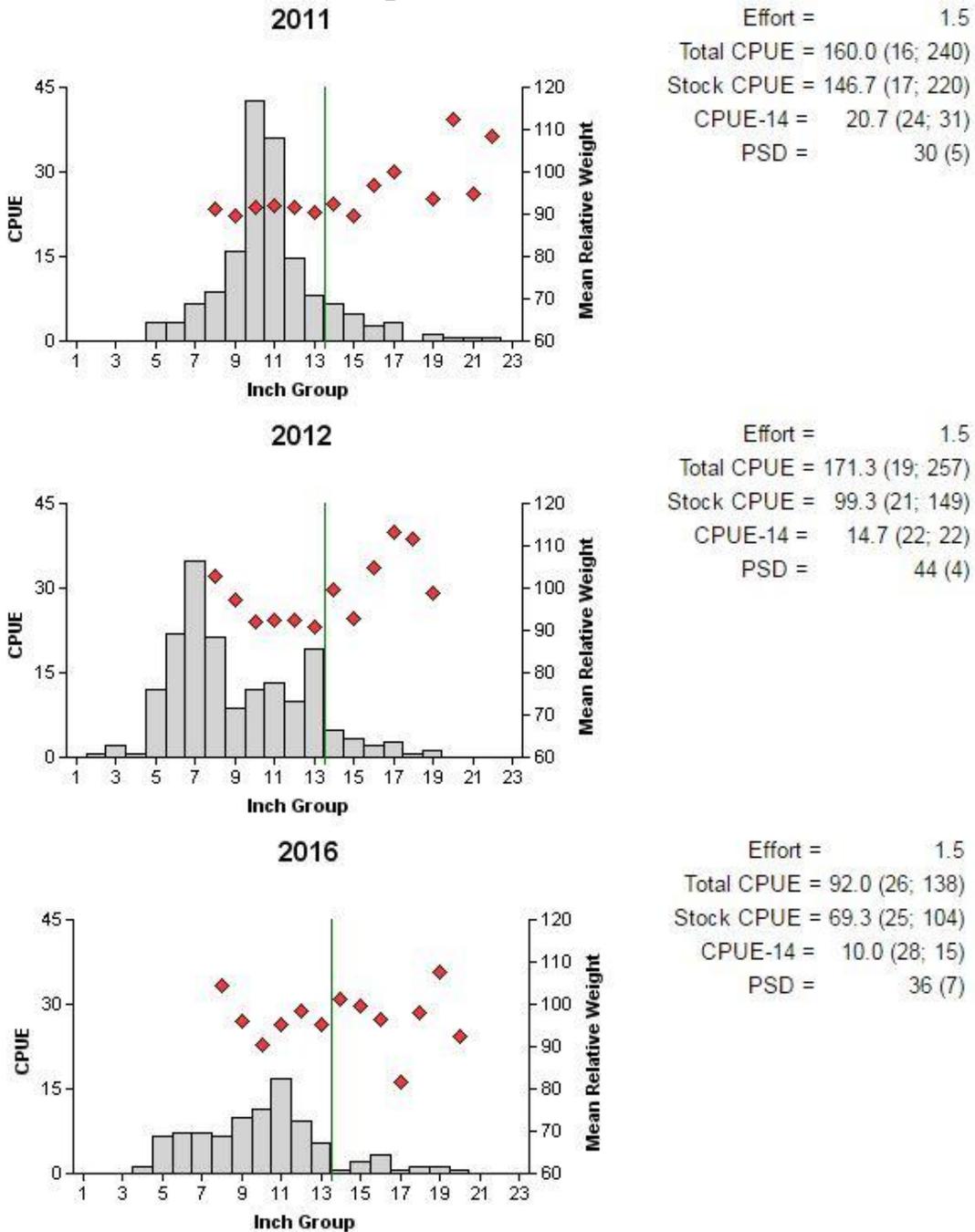


Figure 11. Number of Largemouth Bass caught per hour (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall electrofishing surveys, Eagle Mountain Reservoir, Texas, 2011, 2012, and 2016. Vertical lines represent length limit at time of sampling.

Largemouth Bass

Table 11. Creel survey statistics for Largemouth Bass at Eagle Mountain Reservoir, Texas, from June 2016 through May 2017. Catch rate is for all anglers targeting Largemouth Bass. Harvest is partitioned by the estimated number of fish harvested by non-tournament anglers and the number of fish retained by tournament anglers for weigh-in and release. The estimated number of fish released by weight category is for anglers targeting Largemouth Bass. Relative standard errors (RSE) are in parentheses. **[RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]**

Statistic	2016/2017
Surface area (acres)	8,504
Directed angling effort (h)	
Tournament	5,065.3 (31)
Non-tournament	20,723.3 (27)
All black bass anglers combined	25,788.6 (26)
Angling effort/acre	3.0 (26)
Catch rate (number/h)	0.7 (26)
Harvest	
Non-tournament harvest	509 (75)
Harvest/acre	0.06 (75)
Tournament weigh-in and release	503 (18)
Percent legal released (non-tournament)	90.7

Largemouth Bass

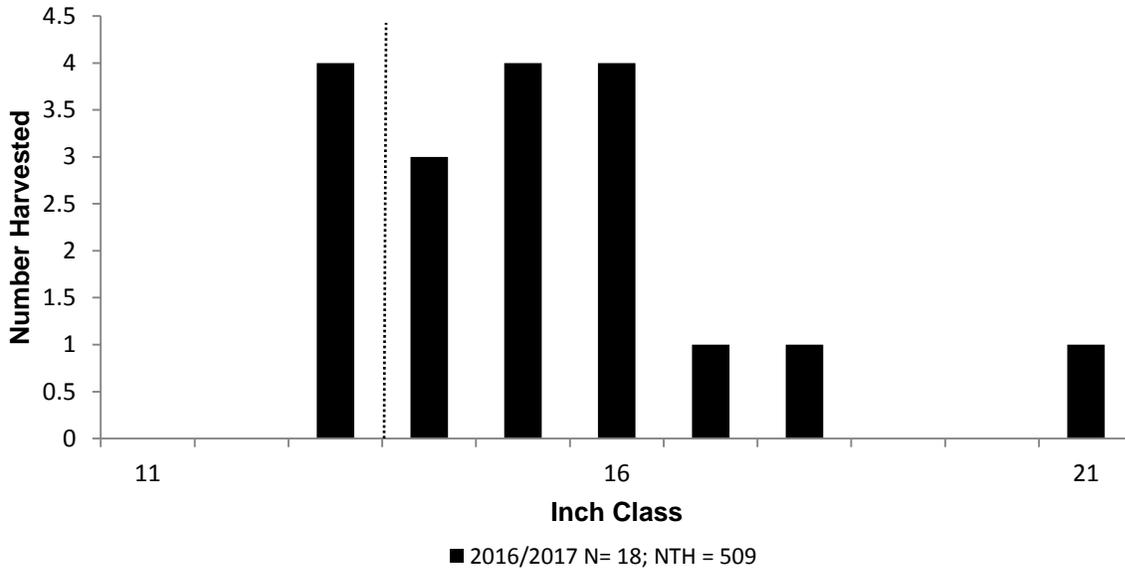


Figure 12. Length frequency of non-tournament harvested Largemouth Bass observed during creel surveys at Eagle Mountain Reservoir, Texas, June 2016 through May 2017, all anglers combined. N is the number of harvested Largemouth Bass observed during creel surveys, and NTH is the estimated non-tournament harvest for the creel period. Dashed line indicates minimum length limit at time of survey.

Table 12 Results of genetic analysis of Largemouth Bass collected by fall electrofishing, Eagle Mountain Reservoir, Texas, 2004, 2012, and 2016. FLMB = Florida Largemouth Bass, NLMB = Northern Largemouth Bass, Intergrade = hybrid between a FLMB and a NLMB. Genetic composition was determined by electrophoresis prior to 2005 and with micro-satellite DNA analysis since 2005.

Year	Sample size	Number of fish			% FLMB alleles	% FLMB
		FLMB	Intergrade	NLMB		
2004	30	1	21	8	29.2	3.3
2012	30	0	30	0	44.0	0.0
2016	30	1	28	1	43.0	3.3

Black Crappie

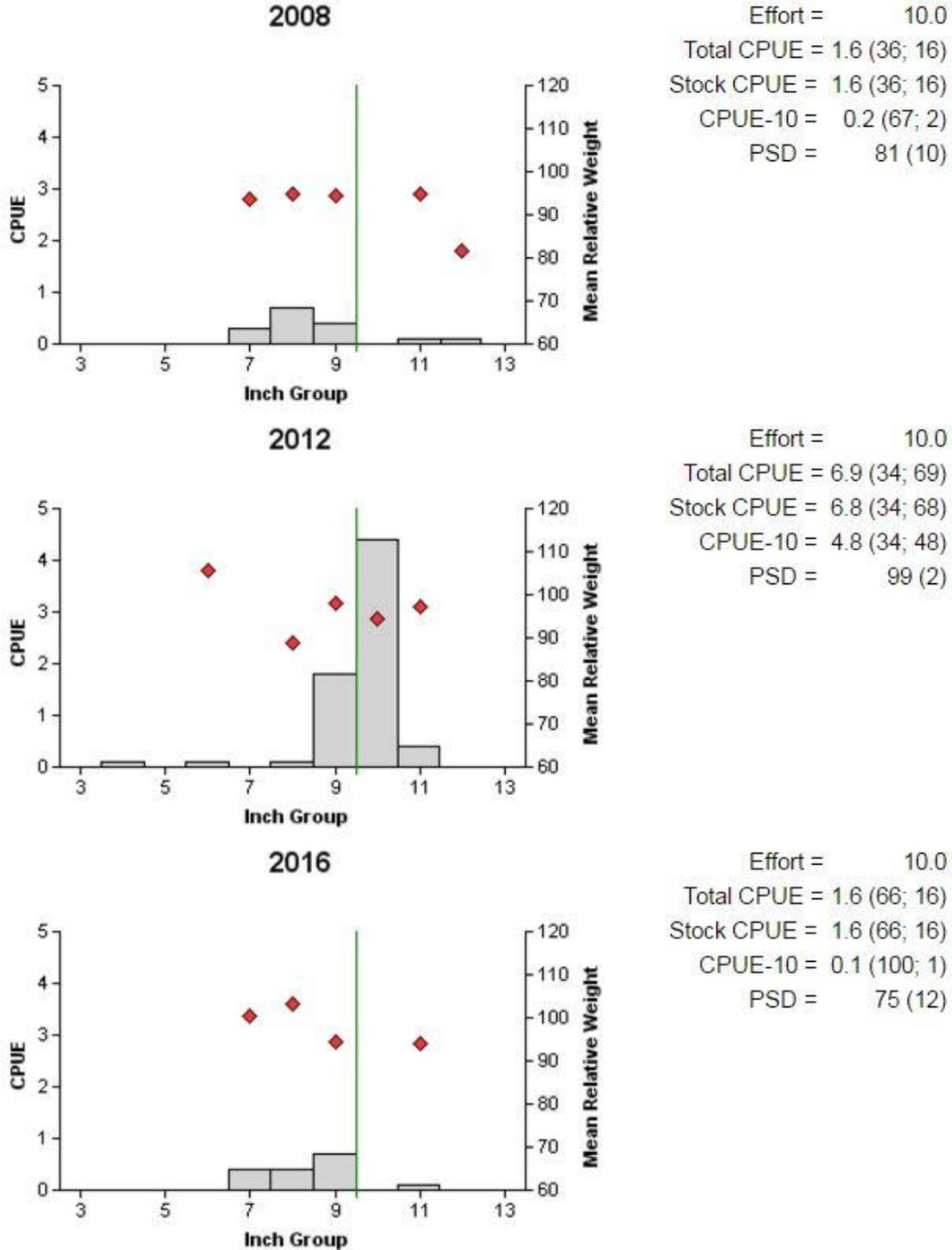


Figure 13. Number of Black Crappie caught per net night (CPUE, bars), mean relative weight (diamonds), and population indices (RSE and N for CPUE and SE for size structure are in parentheses) for fall trap net surveys, Eagle Mountain Reservoir, Texas, 2008, 2012, and 2016. Vertical line represents length limit at time of sampling.

Crappie Species

Table 13. Creel survey statistics for Crappie (White Crappie and Black Crappie combined) at Eagle Mountain Reservoir, Texas, from June 2016 through May 2017. Total catch per hour is for anglers targeting Crappie and total harvest is the estimated number of Crappie harvested by all anglers. Relative standard errors (RSE) are in parentheses. **[RSE for directed effort and total harvest is the same as directed effort/acre and total harvest/acre, respectively]**

Creel Survey Statistic	Year
	2016/2017
Surface area (acres)	8,504
Directed effort (h)	351.6 (75)
Directed effort/acre	0.04 (75)
Total catch per hour	0.8 (NA)
Total harvest	45.4 (197)
Harvest/acre	>0.00 (197)
Percent legal released	0

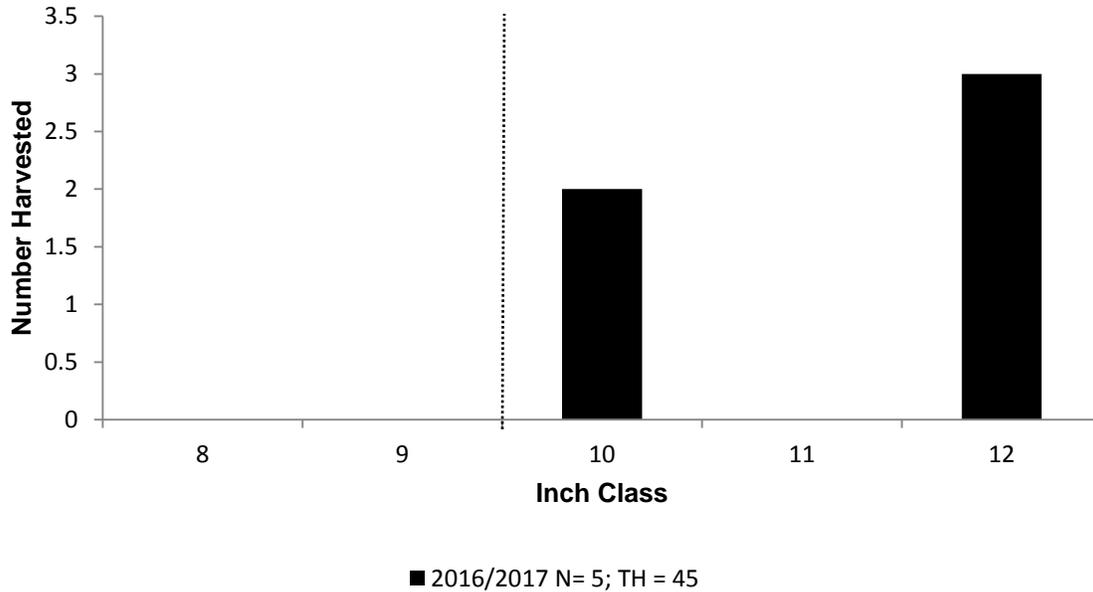


Figure 14. Length frequency of harvested Crappie observed during creel surveys at Eagle Mountain Reservoir, Texas, June 2016 through May 2017, all anglers combined. N is the number of harvested Crappie observed during creel surveys, and TH is the total estimated harvest for the creel period. Dashed line indicates minimum length limit at time of survey.

Table 14. Proposed sampling schedule for Eagle Mountain Reservoir, Texas. Survey period is June through May. Gill netting surveys are conducted in the spring, while electrofishing and trap netting surveys are conducted in the fall. Standard survey denoted by S and additional survey denoted by A.

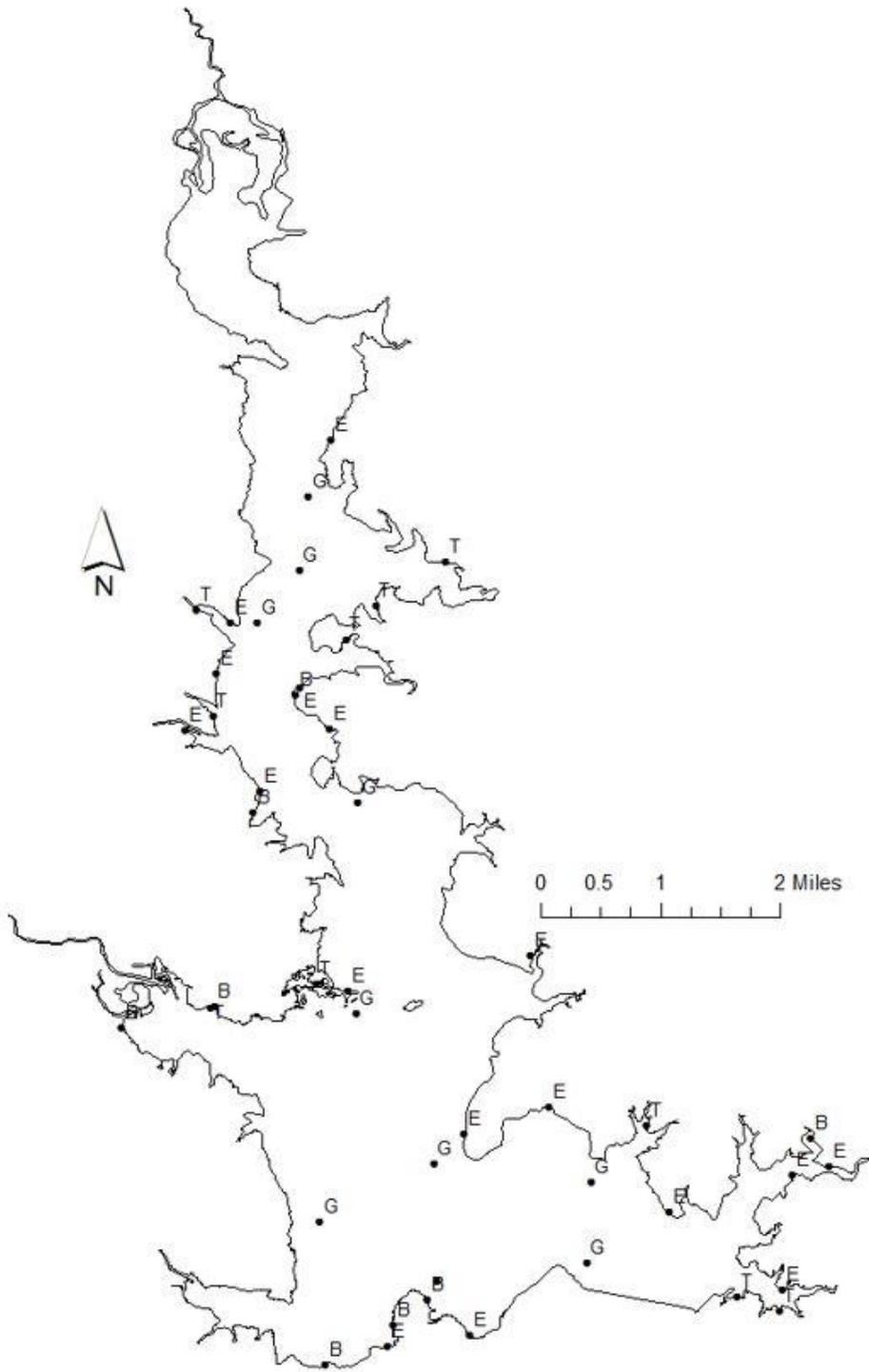
Survey year	Electrofishing Fall(Spring)	Low Frequency Electrofishing	Trapnet	Gillnet	Habitat			Creel survey	Report
					Structural	Vegetation	Access		
2017-2018									
2018-2019		A							
2019-2020									
2020-2021	S	A	S	S			S	S	

30
APPENDIX A

Number (N) and catch rate (CPUE) and relative standard error (RSE) of all species collected from all gear types from Eagle Mountain Reservoir, Texas, 2016-2017. Effort for gill netting and trap netting was 10 net nights. Effort for electrofishing was 1.5 hours.

Species	Gill Netting			Trap Netting			Electrofishing		
	N	CPUE	RSE	N	CPUE	RSE	N	CPUE	RSE
Spotted Gar	1	0.1	100						
Longnose Gar	6	0.6	71						
Gizzard Shad	210	21.0	14				569	379.3	26
Threadfin Shad	1	0.1	100				1,579	1,052.7	27
Common Carp	3	0.3	71						
River Carpsucker	16	1.6	59						
Smallmouth Buffalo	78	7.8	27						
Blue Catfish	262	26.2	19						
Channel Catfish	24	2.4	40						
White Bass	75	7.5	32						
Yellow Bass	21	2.1	50						
Bluegill	3	0.3	100				230	153.3	21
Longear Sunfish							114	76.0	24
Redear Sunfish							2	1.3	100
Spotted Bass							12	8.0	56
Largemouth Bass							138	92.0	26
White Crappie				11	1.1	42			
Black Crappie	1	0.1	100	16	1.6	66			
Freshwater Drum	7	0.7	57						

APPENDIX B



Location of sampling sites, Eagle Mountain Reservoir, Texas, 2016-2017. Trap net, gill net, and electrofishing stations are indicated by T, G, and E, respectively. Boat ramps are indicated with a B. Water level was near full pool at time of sampling.

APPENDIX C

Historical catch rates of targeted species by gear type for Eagle Mountain Reservoir, Texas, for specified years.

Gear	Species	Year											
		1988	1990	1992	1995	1998	2000	2001	2002	2004	2005	2008	2009
Gill Netting (fish/net night)	Blue Catfish			0.0	0.9	0.6		0.9			7.9		10.3
	Channel Catfish	8.0	5.0	7.0	11.8	3.8		2.3			6.5		9.3
	White Bass	7.0	9.0	3.0	10.3	11.1		3.7			6.1		25.0
Electrofishing (fish/hour)	Gizzard Shad	214.0	291.0	328.7	274.0	589.3	711.3		500.5	437.4		506.0	497.3
	Threadfin Shad	387.0	37.0	155.3	115.3	579.3	670.0		107.3	528.7		633.3	342.0
	Bluegill	273.0	212.0	276.0	132.0	47.3	140.0		259.1	264.0		267.3	181.3
	Longear Sunfish	109.0	145.0	0.0	98.0	52.7	148.0		92.5	143.3		219.3	149.3
	Redear Sunfish	32.0	5.0	36.7	18.7	2.0	4.7		15.5	1.3		28.0	37.3
	Spotted Bass	25.0	21.0	54.7	48.0	42.0	18.7		30.4	21.3		31.3	13.3
	Largemouth Bass	173.0	110.0	222.7	150.0	93.3	105.3		64.9	116.0		142.0	96.0
Trap Netting (fish/net night)	White Crappie	4.0	9.0	4.8	1.4	3.4	3.2			3.7		0.9	
	Black Crappie	0.0	0.0	0.0	0.5	6.4	0.7			2.2		1.6	

Appendix C, continued.

Gear	Species	Year					Average	
		2010	2011	2012	2013	2016		2017
Gill Netting (fish/net night)	Blue Catfish				20.1		26.2	8.4
	Channel Catfish				6.8		2.4	6.3
	White Bass				7.5		7.5	9.0
Electrofishing (fish/hour)	Gizzard Shad	484.7	765.3	612.7		379.3		470.8
	Threadfin Shad	366.7	1156.0	1008.7		1052.7		510.0
	Bluegill	272.7	150.7	226.7		153.3		204.0
	Longear Sunfish	140.0	92.0	121.3		76.0		113.3
	Redear Sunfish	10.0	22.0	8.7		1.3		15.9
	Spotted Bass	12.0	16.7	13.3		8.0		25.4
	Largemouth Bass	211.3	160.0	171.3		92.0		136.3
Trap Netting (fish/net night)	White Crappie			0.6		1.1		0.9
	Black Crappie			6.9		1.6		2.0